APPENDIX A
Methodology for Urban and Agricultural Demand Projections

DEMAND ASSESSMENTS AND PROJECTIONS

Demand assessments for 2000 and projections for 2025 were made for the following water use categories:

1. Public Water Supply (PWS).
2. Domestic Self-Supply (DSS) and Small Public Supply Systems.
3. Commercial/Industrial Self-Supply.
4. Recreational Self-Supply.
5. Thermoelectric Power Generation Self-Supply.
6. Agricultural Self-Supply.

Water demand projections through the year 2025 included analyses under average (mean) rainfall conditions and under drought conditions. These projections are based on current trends and circumstances. Projections should therefore be understood as surprise free, and imply an extension of current production, market and legal circumstances.

In addition, the projections are unconstrained by supply availability or further demand management (conservation). Therefore, there is the opportunity to reduce these projected demand levels through the policies and activities that would be put in place based on potential or observed negative natural resource impacts, or in response to actual drought events.

Wherever population represented an independent variable for projection purposes (the first four categories of use), the county assessment by the U.S. Bureau of the Census (2000) was used for 2000 and the medium range county population projections published by the Bureau of Economic and Business Research (BEBR, 2002) was used for the 2025 time horizon.

Wherever irrigation requirements are calculated (for agricultural and recreational use), the Agricultural Field Scale Irrigation Requirements Simulation (AFSIRS) model was used. Irrigation requirements were calculated for average (mean) and 1-in-10 year droughts. Irrigation requirements are equal to the difference between evapotranspiration and effective rainfall. Effective rainfall is equal to the rainfall that is stored in the plant root zone. Changing rainfall levels and timing therefore affect irrigation requirements. However, observed demand levels will vary based on the irrigation managers' perceptions and responses to changing rainfall patterns. Realistically, some may allow plants to experience some level of stress before changing irrigation schedules, while others may habitually over-water at a level that satisfies irrigation demands even during drought events.

For PWS-served and domestic self-supplied demands, the 2000 demand per capita rates were considered to represent the drought level demand rates (per capita), and these demand rates were applied to the relevant projected populations. Projected average demands were reached by subtracting the percentage by which observed demand per capita rates for 2000 exceeded the most recent average rainfall year (1996), as reported by the U.S. Geological Survey (USGS), up to a high of a six percent difference.

Average and 1-in-10 Rainfall

An average rainfall year is defined as a year with rainfall equal to the mean annual rainfall for the period of record. A l-in-10 year drought condition is defined as below normal rainfall with a 90 percent probability of being exceeded over a l2-month period. This means that there is a 10 percent chance that less than this amount will be received in any given year.

CATEGORIES OF WATER USE

(1 & 2) PWS and DSS Demands

Public water supply (PWS) and domestic self-supply (DSS) demand assessments and projections were developed for the District for 2000 and 2025. The domestic self-supplied category includes small public supply systems with projected demands of less than 0.1 million gallons per day (MGD) in 2025, as well as residents that supply their own water needs. Self-supplied residents may be within or outside of utility boundaries. Water demands were forecast by multiplying population projections by per capita water use rates. Per capita water use rates were calculated based on 2000 population data from the U.S. Bureau of the Census (2000) and the water pumpage for each utility, as reported by the USGS (USGS, 2000). The population projections for 2025 for each county were based on the medium range forecasts published by the University of Florida – Bureau of Economic and Business Research (BEBR, 2002).

The 2000 and projected 2025 utility-served areas used in this analysis were obtained from the utilities. Adjustments were made to account for the known future expansion of the current served areas. It was assumed that all projected population within areas being served by a utility would be connected to that PWS system. The breakdown of populations within utility-served areas into PWS-served and domestic self-supplied categories was modified in several instances based on utility input.

Per Capita Rates

Per capita water use rates for 2000 for each utility were calculated by dividing raw water pumped by the permanent resident population served by PWS utilities. The USGS and District pumpage reports provided raw water withdrawal data. The above-

mentioned methodology determined total population and the number of individuals served by the utilities.

These per capita rates include total use, incorporating use by seasonal residents and tourists, commercial and industrial utility supplied use and the losses incurred in water delivery, in addition to the use by permanent residents. Irrigation demand for PWS-served households using private well water for their irrigation was not assessed due to the lack of available data.

The year 2000 was a drought year (which actually exceeded a 1-in-10 year level of recurrence); therefore, per capita rates for 2000 were used to develop the drought 2025 utility demand projections. Adjustments were then made to these projections to normalize them for average rainfall conditions.

Domestic self-supply per capita rates within PWS utility service area boundaries were assumed to be the same as for the utility serving that service area. The per capita rates for the domestic self-supplied users in areas not served by public utilities were assumed to be the weighted average of the PWS per capita rates for the county.

PWS and DSS Average and 1-in-10 Year Drought Adjustments

Indoor use categories need no adjustment from the year 2000 (drought) observed values for an average year, as these categories would have no demand shifts related to drought. Unadjusted base demand for a utility was projected by multiplying a base year per capita rate by a projected population. If desired, the withdrawal distribution (by month) can be derived from historical demand curves for the utility. The difference between the monthly demand for the base year and the unconstrained demand for an average year, or a l-in-10 year will directly depend on the changes in the outdoor use, specifically, changes in demand for landscape irrigation. If the base year is an average year, then there is no need for an adjustment from base to average. However, if the base year is significantly wetter or drier than average, then unconstrained demands for outdoor use will adjust proportionally.

Population Served

2000 Population

U.S. Census data were used as the basis for the 2000 population and the distribution of that population. Block level information from the census count was used as the basic unit of analysis. Total population, occupied housing units and persons per occupied housing unit were retrieved from census data. In the absence of a self-supplied unit count in the 2000 Census, the self-supplied population within utility-served areas was taken as a constant based on the 1990 Census (which included household water source on its long form).

Estimates of occupied units connected to PWS systems and occupied units that are self-supplied for each block were calculated. It was assumed that the percentages of units occupied and the number of occupants per unit for PWS-connected and domestic self-supplied units were the same. Public water supplied populations and self-supplied populations were calculated by multiplying the number of occupied units by the number of persons per occupied unit for the respective block.

The geographic areas represented by the census blocks and the utility service areas were input as polygon layers into the SFWMD Geographic Information System (GIS). Population density PWS-served and self-supplied areas were calculated for each block assuming a uniform density within each block. Imagery was used to review decisions when necessary. The two layers were overlaid to create a polygon layer with the attribute data from the two original layers. Population assessment of PWS-served and domestic self-supplied were then calculated for the new polygon layer by multiplying the polygon area by the population density. The populations for each service area were then totaled.

2025 Population Projections

The medium range county projections as published by the Bureau of Economic and Business Research (BEBR, 2002) were used for 2025 population projections. The geographic distribution of the 2025 population was assessed using the ratio of Traffic Analysis Zone (TAZ) population growth for the areas covered by TAZs. The geographic distribution of the 2025 population for areas not covered by TAZs was based on the population distribution in the 2000 census block data, or was determined from information in the county's comprehensive plans. Total county population was limited to the county total from the BEBR medium range projections.

The geographic areas represented by the TAZs and the utility-served areas were input as polygon layers into the SFWMD GIS. Population density was calculated for each TAZ assuming a uniform density within each zone. The layers were overlaid to create a new polygon layer with the attribute data from the original layers. Population estimates were then recalculated for the new polygon layer by multiplying the area of the polygon by the population density. The populations for each utility-served area were then totaled and limited not to exceed the BEBR medium range population projection for each county.

Existing and future population within an area being served by a utility was assigned to that utility. This means that within utility-served areas, the domestic self-supplied population was assumed to be zero by 2025, as utilities serve formerly self-supplied residents. Any growth in population within an area not planned to be served by a utility was assigned to the domestic self-supplied category. **Table A-1** outlines the columns showing projection calculations for PWS-served and domestic self-supplied users, and **Tables A-2** through **A-4** shows these projections for St. Lucie and Martin counties and eastern Okeechobee County.

Table A-1. Column Legend for the Public Water Supplied and Domestic Self-Supplied Demand Projections Table for each County.

Columns	Heading	Description
(a)	Utility	Name of the public water supply utility, for which 2000 assessments and 2025 projections are made.
(b)	Total Population 2000/2025	Permanent resident population that resides within each utility's area served boundaries.
(c)	PWS Population 2000/2025	Permanent resident population served by each PWS utility.
(d)	PWS Base (drought) MGD 2000/(2025)	For 2000, pumpage reported by the USGS. For 2025, projected demands based on the projected population served multiplied by the gallons per capita day (GPCD) observed in 2000 (column e).
(e)	GPCD 2000/2025: Gallons Per Capita Day	For 2000, pumpage reported by the USGS (column d) divided by permanent resident population served by each PWS utility (column c). For 2025, this per capita rate is the same as observed in 2000 for each utility.
(f)	DSS Population	Permanent resident population not served by each PWS utility that resides within each utility's active service boundaries.
(g)	DSS Base MGD 2000/2025	Assessed demands based on the self-supplied population (column f) multiplied by the gallons per capita day (GPCD) observed in 2000 (column e).
(h)	Average Factor	Proportional difference between county per capita usage for the county in 2000 and the most recent average rainfall year (1996) – as reported by the USGS, up to a maximum of a 6 percent difference (DEP standard).
(i)	PWS Average MGD 2025	For 2025 PWS drought MGD (column d) for each utility for 2025 multiplied by the average factor (column h).
(j)	DSS Average MGD 2000/2025	For 2025 DSS drought MGD (column g) for each utility for 2025 multiplied by the average factor (column h).

Table A-2. Public Water Supplied and Domestic Self-Supplied Demand Projections for St. Lucie County.

a	b	c	d	e	f	g	h	i	j
Utility	**Total Popn 2000**	**PWS Popn 2000**	**PWS Base MGD 2000**	**GPCD 2000**	**DSS Popn 2000**	**DSS Base 2000**			
Ft. Pierce Utilities Authority	61,848	58,612	8.92	152	3,236	0.49			
Spanish Lakes Utilities	4,450	3,769	0.79	210	681	0.14			
City of Port St. Lucie	68,667	61,228	6.65	109	7,439	0.81			
Reserve	1,053	952	0.20	210	101	0.02			
Harbour Ridge	823	823	0.14	170	0	0.00			
St. Lucie West Service District	4,180	4,025	0.75	186	155	0.03			
St. Lucie County – North	901	289	0.13	450	612	0.28			
Panther Woods	206	206	0.09	437	0	0.00			
Not in Utility	50,567			136	50,567	6.88			
Totals	192,695	129,904	17.67		62,791	8.65			
Utility	**Total Popn 2025**	**PWS Popn 2025**	**PWS Drought MGD 2025**	**GPCD 2025**	**DSS Popn 2025**	**DSS Drought MGD 2025**	**Avg Factor**	**PWS Avg MGD 2025**	**DSS Avg MGD 2025**
Ft. Pierce Utilities Authority	103,427	103,427	15.74	152	0	0.00	0.972	15.30	0.00
Spanish Lakes Utilities	4,450	4,450	0.93	210	0	0.00	0.972	0.91	0.00
City of Port St. Lucie	141,102	141,102	15.33	109	0	0.00	0.972	14.90	0.00
Reserve	Reserve served by St. Lucie West by 2025								
Harbour Ridge	823	823	0.14	170	0	0.00	0.972	0.14	0.00
St. Lucie West Service District	26,550	26,550	4.95	186	0	0.00	0.972	4.81	0.00
St. Lucie County – North	12,731	12,731	5.73	450	0	0.00	0.972	5.57	0.00
Panther Woods	929	929	0.41	437	0	0.00	0.972	0.39	0.00
Not in Utility	7,388			136	7,388	1.00	0.972		0.98
Totals	297,400	290,012	43.23		7,388	1.00		42.01	0.98

Note: See Table A-1 for Table Legend.

Table A-3. Public Water Supplied and Domestic Self-Supplied Demand Projections for Martin County.

a	b	c	d	e	f	g	h	i	j
Utility	**Total Popn 2000**	**PWS Popn 2000**	**PWS Base MGD 2000**	**GPCD 2000**	**DSS Popn 2000**	**DSS Base 2000**			
Florida Water Services	1,556	518	0.17	328	1,038	0.34			
Martin County Utilities	51,130	45,304	8.30	183	5,826	1.07			
Miles Grant/Utility Inc.	1,028	1,028	0.15	146	0	0.00			
Pipers Landing	584	584	0.15	257	0	0.00			
Sailfish Point	372	372	0.21	565	0	0.00			
City of Stuart	17,979	16,805	3.65	217	1,174	0.25			
Plantation Utilities/Indian River	648	648	0.17	262	0	0.00			
Indiantown Water Company	5,393	5,252	0.70	133	141	0.02			
South Martin Regional Utility	14,818	14,699	3.94	268	119	0.03			
Village of Tequesta	2,713	2,496	1.17	470	217	0.10			
Town of Jupiter	675	594	0.19	313	81	0.03			
Not in Utility	29,835			213	29,835	6.35			
Totals	126,731	88,300	18.80		38,431	8.19			
Utility	**Total Popn 2025**	**PWS Popn 2025**	**PWS Drought MGD 2025**	**GPCD 2025**	**DSS Popn 2025**	**DSS Drought MGD 2025**	**Avg Factor**	**PWS Avg MGD 2025**	**DSS Avg MGD 2025**
Florida Water Services	Florida Water Services purchased by Martin County Utilities in Fall of 2003								
Martin County Consolidated[a]	105,089	105,089	19.25	183	0	0.00	0.967	18.62	0.00
Miles Grant/Utility Inc.	1,090	1,090	0.16	146	0	0.00	0.967	0.15	0.00
Pipers Landing	584	584	0.15	257	0	0.00	0.967	0.15	0.00
Sailfish Point	372	372	0.21	565	0	0.00	0.967	0.20	0.00
City of Stuart	17,979	17,979	3.90	217	0	0.00	0.967	3.78	0.00
Plantation Utilities/Indian River	648	648	0.17	262	0	0.00	0.967	0.16	0.00
Indiantown Water Company	6,193	6,193	0.83	133	0	0.00	0.967	0.80	0.00
South Martin Regional Utility	35,729	35,729	9.58	268	0	0.00	0.967	9.26	0.00
Village of Tequesta[b]	2,713	2,713	1.28	470	0	0.00	0.967	1.23	0.00
Town of Jupiter[c]	4,846	4,846	1.52	313	0	0.00	0.967	1.47	0.00
Not in Utility	12,257			213	12,257	2.61	0.967		2.52
Totals	187,500	175,243	37.04		12,257	2.61		35.82	2.52

a. Formerly Martin County Utilities
b. Village of Tequesta served 4,738 people in 2000 in Palm Beach County. Per capita reflects entire served area boundary.
c. Town of Jupiter served 47,482 people in 2000 in Palm Beach County. Per capita reflects entire served area boundary.

Table A-4. Domestic Self-Supplied Demand Projections for the Eastern Okeechobee County.

a	b	c	d	e	f	g	h	i	j
Utility	Total Popn 2000	PWS Popn 2000	PWS Base MGD 2000	GPCD 2000	DSS Popn 2000	DSS Base 2000			
Not in Utility	1,238	0	0.00	112	1,238	0.14			
Utility	Total Popn 2025	PWS Popn 2025	PWS Drought MGD 2025	GPCD 2025	DSS Popn 2025	DSS Drought MGD 2025	Avg Factor	PWS Avg MGD 2025	PSS Avg MGD 2025
Not in Utility	1,610	0	0.00	112	1,610	0.18	0.940	0.00	0.17

Note: See Table A-1 for Table Legend.

(3) Commercial/Industrial Self-Supply

The employment by sector was evaluated regarding the predominant types of employment found in the District, and whether these employment types could be anticipated to grow at the same rate and in the same direction as the population. In the SFWMD, the majority of the employees are found in the service and retail sales sectors, indicating that water demand by these sectors will generally grow along with the population. Demand for this category of water use was projected to grow at the rate of each county's population growth. Water used for commercial and industrial purposes that is supplied by utilities is included with other utility demands. **Table A-5** summarizes Upper East Coast (UEC) commercial and industrial self-supplied demand projections; 2000 use was assessed from SFWMD permits.

Table A-5. Commercial and Industrial Self-Supplied Demand.

County	2000	2005	2010	2015	2020	2025
St. Lucie MGD	0.10	0.11	0.12	0.13	0.14	0.15
St. Lucie Population	192,695	213,636	234,577	255,518	276,459	297,400
Martin MGD	3.20	3.51	3.81	4.12	4.43	4.73
Martin Population	126,731	138,885	151,039	163,192	175,346	187,500
Total MGD	3.30	3.62	3.94	4.25	4.57	4.89

(4) Recreation Self-Supply

The recreational self-supplied demand category includes self-supplied irrigation demands for large landscaped and recreational areas (as opposed to private homes), and for golf courses. Because of the data sources available, golf course demands by county are projected separately and added to the other landscape and recreation demands. Non-golf course landscaping and recreational water use was assumed to increase at the same rate as the county population, with 2000 used as the base year. Recreational irrigation requirement estimates for average and l-in-10 year droughts were made using the AFSIRS model. The irrigation requirements were calculated similarly to other irrigation

requirements, using a representative irrigation system/rainfall station/soil type combination for each county.

Landscape

Demand projections for this section include irrigated acreage permitted for landscaping and recreation, excluding golf courses. Landscaping acreage was projected to increase at the same rate as the county population, with 2000 used as the base year. Acreage projections for large-scale landscaping and recreation self-supplied acreage are outlined in **Table A-6**.

Table A-6. Landscape Self-Supplied Acreage.

County	2000	2005	2010	2015	2020	2025
St. Lucie Acres	1,715	1,901	2,088	2,274	2,461	2,647
St. Lucie Population	192,695	213,636	234,577	255,518	276,459	297,400
Martin Acres	1,312	1,438	1,564	1,689	1,815	1,941
Martin Population	126,731	138,885	151,039	163,192	175,346	187,500
Total Acres	3,027	3,339	3,651	3,964	4,276	4,588

Golf Courses

For golf course projections, historical irrigated golf course acreage data were gathered from the District's consumptive use permitting (CUP) database, the Golf Course Directory (National Golf Foundation, 2001) and personal communication with staff from several of the golf courses listed. Irrigated golf course acreage projections were made by statistically correlating historical acreage to historical population, or to a time trend or to both. Acreage projections were made for total irrigated golf course acreage, and those currently supplied by a reuse or potable utility system subtracted from the total irrigated acreage projection.

St. Lucie County

Golf courses currently in St. Lucie County are shown in **Table A-7**. As in other counties, the growth in golf course acreage has occurred irregularly on a year-by-year basis. **Equation A-l** (using simple exponential smoothing) was estimated to project irrigated golf course acreage in St. Lucie County.

Table A-7. Golf Courses in St. Lucie County.

Name	Year Opened	Irrigated Acres	Self-Supplied Acreage
Indian Hills G&CC	1938	89	89
Club Med Sandpiper	1961	187	187
Indian Pines GC	1970	50	50
Spanish Lakes I	1972	8	8
Golf Village CC	1980	5	5
Spanish Lakes Golf Village	1982	8	8
Meadowood (Monte Carlo)[a]	1983	122	0
Spanish Lakes CC	1983	25	25
Legacy G&TC	1984	145	145
Panther Woods CC[b]	1984	149	27
Reserve G&TC (PGA)	1984	146	146
Ocean Village GC	1985	50	50
Gator Trace G&CC	1986	60	60
PGA CC	1988	130	130
Savanna GC	1988	59	59
St Lucie West (PGA)[a]	1988	100	0
Spanish Lakes Fairways[a]	1989	143	0
Fairwinds	1991	144	144
Wilderness GC	1992	46	46
Ballantrae G&YC[a]	1993	120	0
PGA GC in PGA Village	1996	435	435
St James GC	2000	122	122
Total		2,343	1,736

a. Irrigated acreage totally on reuse
b. Irrigated acreage partially on reuse

Equation A-1.

Model Parameters:	Estimate	Standard Error	T	Prob>!T!
LEVEL Smoothing Weight	.9605	.1135	8.4592	<.0001
TREND Smoothing Weight	.11461	.0565	2.0295	0.0494
Residual Variance	11980			
Smoothed Level	2341			
Smoothed Trend	81.7444			

Goodness-of-fit Statistics:	Value
Root Mean Square Error	106.683
Mean Absolute Percent Error	54.97769
R-Square	.979

Census and BEBR population data were used to estimate and project **Equation A-1**. **Equation A-l** was estimated using ordinary least squares, and the results shown in **Table A-8** were obtained.

Table A-8. Historical and Projected Irrigated Golf Course Acreage in St. Lucie County.

Year	Historical Acreage	Projected Acreage
1965	276	
1970	326	
1975	334	
1980	339	
1985	984	
1990	1,476	
1995	1,786	
2000	2,343	2,343
2005		2,750
2010		3,159
2015		3,568
2020		3,976
2025		4,303

Table A-9. Irrigation Requirements for Projected Self-Supplied Golf Courses in St. Lucie County.

		2000	2005	2010	2015	2020	2025
Irrigated Acreage		2,343	2,750	3,159	3,568	3,976	4,303
Self-Supplied Irrigated Acreage		1,736	2,143	2,552	2,961	3,369	3,696
Net Irrigation Requirements		**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
Average	(inches)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)
January	1.0	61	76	90	105	119	130
February	1.4	90	111	132	153	174	191
March	2.3	141	175	208	241	274	301
April	3.2	203	250	298	346	393	432
May	2.9	179	221	263	306	348	381
June	1.8	113	140	166	193	220	241
July	2.0	127	157	187	217	247	271
August	1.4	90	111	132	153	174	191
September	0.8	47	58	69	80	91	100
October	0.7	42	52	62	72	82	90
November	0.8	52	64	76	88	101	110
December	0.8	47	58	69	80	91	100
Total	19.0	1,193	1,472	1,753	2,034	2,315	2,539
Net Irrigation Requirements		**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
1-in-10	(inches)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)
January	1.4	88	109	129	150	171	187
February	1.8	113	140	166	193	220	241
March	2.4	151	186	222	257	293	321
April	3.5	220	272	323	375	427	468
May	3.5	220	272	323	375	427	468
June	2.3	145	178	213	247	281	308
July	2.7	170	210	249	289	329	361
August	1.9	119	147	176	204	232	254
September	1.1	69	85	102	118	134	147
October	1.0	63	78	92	107	122	134
November	1.1	69	85	102	118	134	147
December	1.0	63	78	92	107	122	134
Total	23.7	1,490	1,839	2,190	2,541	2,891	3,172

Note: Irrigation requirements based on generic sandy soil, Ft Pierce climate station and irrigation efficiency of 75 percent.

Martin County

Golf courses currently in Martin County are shown in **Table A-10**. Martin County has experienced rapid growth in irrigated golf course acreage since the early 1960s. As in other counties, the growth in golf course acreage has occurred irregularly on a year-by-year basis.

Table A-10. Golf Courses in Martin County.

Name	Opened	Irrigated Acreage	Self-Supplied Acreage
Martin County GC	1925	182	182
Jupiter Island GC	1958	103	103
Stuart Y & CC	1969	140	140
Jupiter Hills Club[a]	1970	240	0
Monterey Y & CC	1970	36	36
Pine Lakes GC	1970	50	50
Crane Creek & Tower[a]	1972	186	0
Miles Grant CC[a]	1972	49	0
Mariner Sands CC[a]	1973	215	0
River Bend[a]	1974	68	0
Little Club	1975	60	60
Turtle Creek Club[a]	1976	105	0
Evergreen Club	1978	105	105
Indian River Plantation[a]	1978	70	0
Ocean Club at the Hutchinson Island Beach	1978	75	75
Heritage Ridge Y & CC[a]	1979	110	0
Pipers Landing CG[a]	1981	66	0
Sailfish Point GC[a]	1981	144	0
Martin Downs (Tower) CC[a]	1982	85	0
Island Dunes CC	1983	60	60
Eaglewood Homeowners Association[a]	1984	50	0
Harbour Ridge Y & CC	1984	200	200
Indianwood	1984	86	86
Hobe Sound GC	1987	110	110
Monarch CC	1987	148	148
Cypress Links GC	1988	150	150
Loblolly Pines GC[a]	1988	84	0
Willoughby GC	1988	105	105
Cobblestone CC	1989	100	100
All Golf	1990	60	60
Golf World	1990	8	8
Palm Cove (Cutter Sound)	1990	72	72
Lost Lake GC/Double Tree[a]	1992	136	0
Champions Club at Summerfield	1994	90	90
Medalist[a]	1995	75	0
Florida Club[a]	1996	141	0
Floridian Y & CC	1996	120	120
Hammock Creek GC (Golden Bear)	1996	100	100
Eagle Marsh GC[a]	1997	120	0
McArthur GC[b]	2002	90	60
Total		4,334	2,360

a. Irrigated acreage totally on reuse
b. Irrigated acreage partially on reuse

Equation A-2 was estimated using ordinary least squares, and adjusted for the 2000 acreage to project irrigated golf course acreage in Martin County. Projections are presented in **Table A-11**.

Equation A-2.

Model Parameters:	Estimate	Standard Error	T	Prob>!T!
LEVEL Smoothing Weight	.85713	.1273	6.7309	<.0001
TREND Smoothing Weight	.001	.1101	.00908	.9928
DAMPING Smoothing Weight	.999	.003	331.4717	<.0001
Residual Variance	13814			
Smoothed Level	4339			
Smoothed Trend	109.8011			

Goodness-of-fit Statistics:	Value
Root Mean Square Error	12594.8
Mean Absolute Percent Error	4.35574
Mean Absolute Error	92.05873
R-Square	.991

Table A-11. Historical and Projected Irrigated Golf Course Acreage in Martin County.

Year	Historical Acreage	Projected Acreage
1970	751	
1975	1,329	
1980	1,794	
1985	2,485	
1990	3,322	
1995	3,623	
2000	4,104	4,104
2005		4,528
2010		5,074
2015		5,617
2020		6,157
2025		6,695

Table A-12. Irrigation Requirements for Projected Self-Supplied Golf Courses in Martin County.

		2000	2005	2010	2015	2020	2025
Irrigated Acreage		4,104	4,528	5,074	5,617	6,157	6,695
Self-Supplied Irrigated Acreage		2,360	2,784	3,330	3,873	4,413	4,951
Net Irrigation Requirements		**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
Average	(inches)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)
January	1.1	96	113	136	158	180	202
February	1.6	135	159	190	221	252	282
March	2.2	186	219	262	305	348	390
April	2.9	250	295	353	410	467	524
May	2.5	211	249	298	347	395	444
June	1.4	115	136	163	189	216	242
July	1.4	122	144	172	200	228	255
August	1.4	115	136	163	189	216	242
September	0.8	64	76	90	105	120	134
October	0.7	58	68	81	95	108	121
November	0.8	64	76	90	105	120	134
December	0.8	70	83	99	116	132	148
Total	17.4	1,487	1,754	2,098	2,440	2,780	3,119
Net Irrigation Requirements		**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
1-in-10	(inches)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)
January	1.7	147	174	208	242	276	309
February	2.0	173	204	244	284	324	363
March	2.6	224	265	317	368	419	471
April	3.8	327	386	461	536	611	686
May	3.4	288	340	407	473	539	605
June	2.0	167	197	235	273	312	350
July	1.9	160	189	226	263	300	336
August	2.0	167	197	235	273	312	350
September	1.1	90	106	127	147	168	188
October	1.0	83	98	118	137	156	175
November	1.1	90	106	127	147	168	188
December	1.1	96	113	136	158	180	202
Total	23.6	2,012	2,374	2,839	3,303	3,763	4,222

Note: Irrigation requirements based on generic sandy soil, Stuart climate station and irrigation efficiency of 75 percent.

Table A-13. Recreational Self-Supplied Demand Projections in the Upper East Coast.

County / Acreage / Demand	2000	2005	2010	2015	2020	2025
St. Lucie County Irrigated Golf Course Acres	2,343	2,750	3,159	3,568	3,976	4,303
St. Lucie County Self-Supplied Golf Course Acres	1,736	2,143	2,552	2,961	3,369	3,696
St. Lucie County Self-Supplied Landscape Acres	1,715	1,901	2,088	2,274	2,461	2,647
St. Lucie County Average Recreational Self-Supplied Irrigation Requirement (MGY)	2,371	2,778	3,188	3,596	4,006	4,358
St. Lucie County 1-In-10 Recreational Self-Supplied Irrigation Requirement (MGY)	2,962	3,470	3,982	4,492	5,003	5,443
Martin County Irrigated Golf Course Acres	4,224	4,668	5,214	5,757	6,297	6,835
Martin County Self-Supplied Golf Course Acreage	2,360	2,694	3,240	3,783	4,323	4,861
Martin County Self-Supplied Landscape Acreage	1,312	1,438	1,564	1,689	1,815	1,941
Martin County Average Recreational Self-Supplied Irrigation Requirement (MGY)	2,314	2,660	3,083	3,504	3,923	4,342
Martin County 1-In-10 Recreational Self-Supplied Irrigation Requirement (MGY)	3,131	3,600	4,173	4,743	5,311	5,877
UEC Recreational Self-Supplied Average Irrigation Requirement (MGY)	4,685	5,438	6,271	7,100	7,929	8,700
UEC Recreational Self-Supplied 1-In-10 Irrigation Requirement (MGY)	6,093	7,070	8,155	9,235	10,314	11,320

(5) Thermoelectric Power Generation Self-Supply

Thermoelectric power plants may withdraw large quantities of water for cooling purposes. The vast majority of this water is not consumed in the sense that the same water may pass through the plant repeatedly, sequentially circulating through a series of ponds. There will normally be some process and evaporative losses that must be replaced from an external source above and beyond rainfall and runoff. This replacement was assessed for 2000 use and projected for 2025. Electricity utilities were contacted with regard to anticipated increased water needs for cooling purposes. It is noted that there are significant uncertainties associated with the potential deregulation of the industry, and therefore projections of this water use category may be subject to significant change in subsequent water supply plans.

There are two utilities in the UEC Planning Area that use fresh water for cooling purposes, the Florida Power & Light (FPL) Martin Plant and the Indiantown Cogeneration plant. The Indiantown Cogeneration plant has Taylor Creek/Nubbin Slough as its source, which is in the Kissimmee Basin Planning Area, and therefore these demands will be addressed in the Kissimmee Basin Water Supply Plan.

The FPL plant withdraws a significant quantity of water for cooling purposes. Most of this water is necessary to maintain the reservoir impoundment, with calculated losses of 9.8 MGD to evaporation in 2000, based on information received from FPL. This makeup water is projected to grow to 30 MGD in 2005.

(6) Agricultural Self-Supply

The techniques chosen to project crop acreages were those that best reflected the specific crop scenario in each county. This led to some variation in projection techniques between crop types. While it would have been ideal if a comprehensive functional form could have been found that produced tangible projections universally, no such functional form was found. The acreage projections developed here reflect a combination of methods; each deemed appropriate where used. This is consistent with the way in which crop acreage is projected by the Institute of Food and Agricultural Sciences (IFAS) and other water management districts.

Crop acreage projections were needed for St. Lucie and Martin counties, which are both wholly within the UEC Planning Area, as well as the eastern portion of Okeechobee County. For eastern Okeechobee County, crop acreages were frequently projected for the entire county and these projections apportioned. Unless inappropriate, this was done by assuming changes in acreage proportional to the most recently reported acreage ratios. Acreage ratios were developed with the use of District land use maps and with the cooperation of the local IFAS extension offices.

When no statistically valid trend or convincing empirical knowledge of future changes in a crop's acreage was found, then the specific crop's acreage was projected at its most recently reported value for future time horizons.

Average and l-in-10 irrigation requirements were calculated using the AFSIRS model. Historical weather data from the rainfall station, considered to best represent the crop/county combination, were used to calculate irrigation requirements.

A crop's gross irrigation requirement is the amount of water used for evapotranspiration minus effective rainfall, while an irrigation requirement includes both the gross irrigation requirement and the losses incurred in getting irrigation to the crop's root zone. Irrigation efficiency refers to the average percent of total water applied that is stored in the plant's root zone. This relationship is expressed as follows:

Gross Irrigation Requirement = Net Irrigation Requirement / Irrigation Efficiency

Projections of irrigation system type, and the effect of the corresponding irrigation efficiencies, were based on the interpretation of current ratios and trends. There are three basic types of irrigation systems currently used in south Florida crop production. These are seepage (50 percent), sprinkler (75 percent) and microirrigation (85 percent) systems. The irrigation efficiencies estimated by the District are shown in parentheses.

Available water capacity and depth of soil have a direct effect on effective rainfall. An additional factor considered explicitly by the AFSIRS, but combined with soil properties, is the on-farm irrigation management strategy. The AFSIRS model defines eight "generic" soil types representing the major kinds of soils found in Florida. All model runs were made using the generic sandy soil as defined by the AFSIRS model.

Irrigated Crop Types

The irrigated commercially grown crop categories were based on the categories developed by the Water Demand Projection Subcommittee, which was made up of representatives from Florida's five water management districts. These categories are: (1) citrus, (2) other fruits and nuts, (3) vegetables, melons and berries, (4) field crops, (5) greenhouse/nursery, (6) sod, (7) pasture and (8) miscellaneous. Although all of these crops are grown commercially somewhere within the District, not all are grown in the UEC Planning Area. Crop acreage projections were initially made by District staff based on statistical trends, and then sent out and reviewed by the local IFAS extension office.

Citrus

All categories of citrus (oranges, grapefruit, tangerines, limes, etc.) were grouped together for projection purposes. Historical citrus acreage data were gathered from volumes of the Florida Agricultural Statistics Service (FASS) *Commercial Citrus Inventory*, published biennially. Citrus is by far the main irrigated crop grown in the UEC Planning Area.

Other Fruits and Nuts

Within the SFWMD non-citrus fruit crops (avocados, mangos, papaya, etc.) are produced commercially, but there is no significant production of these crops in the UEC Planning Area.

Vegetables, Melons and Berries

Wide varieties of vegetable crops are produced commercially within the SFWMD. For counties with high levels of historical vegetable production, acreage data were gathered from volumes of the FASS *Vegetable Summary*, which is published annually. Information was provided from the local IFAS extension office for counties where it was not possible to discern acreage from the *Vegetable Summary*.

Field crops

Field crop projections within the SFWMD included sugarcane, rice, seed corn, soybean and sorghum. In the UEC Planning Area, sugarcane is grown commercially in Martin County. Historical sugarcane acreage data were gathered from annual volumes of the FASS *Field Crops Summary*.

Greenhouse/Nursery

Varieties of greenhouse and nursery crops are grown within the SFWMD. Historical commercial nursery acreage data for each county were used to make projections using functional forms that correlated nursery acreage with a time trend variable. Historical commercial nursery acreage data were gathered from annual volumes of the Florida Department of Agriculture and Consumer Services (FDACS), *Division of Plant Industry's Annual Reports*.

In addition to nursery plants, there are also regions within the SFWMD that have significant areas used to produce cut flowers and bulbs (caladiums). The acreages of cut flowers and bulbs were projected based on input from the local IFAS extension office.

Sod

There is some variation in the production practices of sod within the SFWMD. Some harvested sod is irrigated and some is not, serving largely as pasture until the sod is sold. Since the objective here is to project irrigation requirements, only irrigated sod is addressed. County acreages of sod were provided by the local IFAS extension office.

Pasture

Improved pasture has, by District definition, the facilities in place to carry out irrigation. However, these facilities were typically designed for drainage and, with the exception of a few noted areas, are very rarely used for irrigation. This is because the returns associated with cattle production do not justify the expense associated with pasture irrigation. When irrigation is carried out, it is usually in a period of extreme drought, and is done to prevent grass from dying.

The assumption was made that, with a few exceptions, that pasture irrigation is not part of this water supply plan's primary projection. Although this assumption may not be the case universally, it is much closer to actual production practices than the values given by any irrigation requirement model.

Miscellaneous

Cattle Watering

Water required for cattle watering was calculated as a function of the number and type of cattle (beef or dairy). Demand projections for cattle watering were based on the District allocation of 12 gallons/cow/day for beef cattle and 150 gallons/cow/day for dairy cattle. Demand for cattle watering is projected across the District to remain at about the 2000 level throughout the projection period. Cattle numbers for 2000 were obtained from the FASS *Livestock Summary*.

Aquaculture

Aquacultural operations withdraw water for circulation purposes, and to replace evaporative losses. The replacement amount was assessed for each county, for which there was a permitted use in 2000.Demand was projected to remain at the 2000 level through 2025.

Demand Projections

Citrus

Historical citrus acreage data were gathered from volumes of the FASS *Commercial Citrus Inventory*, which is published biennially. These data are available from: http://www.nass.usda.gov/fl/rtoc0ci.htm.

The statistical method used to project county-level citrus acreage in the UEC Planning Area is damped trend exponential smoothing. Damped trend exponential smoothing relies on three "smoothing weights" to construct projections: (a) level smoothing weight; (b) trend smoothing weight; and (c) damping smoothing weight. Damped trend exponential smoothing specifies exponential smoothing of both the series level and trend with a trend damping weight. These weights are determined empirically to select the weights that optimally fit the observed data. Damped trend exponential smoothing allows for a gradual "damping" or tapering off the identified trends.

St. Lucie County

Citrus acreage in St. Lucie County was projected using damped trend exponential smoothing, corrected for the year 2000. Time series data at two-year increments were used to estimate the damped trend exponential smoothing model.

Equation A-3.

Model Parameters:	Estimate	Standard Error	T	Prob>!T!
LEVEL Smoothing Weight	.8153	.2565	3.1783	.0058
TREND Smoothing Weight	.9990	.9187	1.0875	.2929
DAMPING Smoothing Weight	.7782	.1992	3.9060	.0013
Smoothed Level	93074			
Smoothed Trend	-6539			

Goodness-of-fit Statistics:	Value
Root Mean Square Error	4073.4
Mean Absolute Percent Error	3335.2
R-Square	.908

Equation A-3 was used to project citrus acreage in St. Lucie County, and resulting projections are shown in **Table A-14**.

Table A-14. Historical and Projected Citrus Acreage in St. Lucie County.

Year	Historic Acreage	Projected Acreage
1966	63,703	
1968	74,962	
1970	75,397	
1972	73,822	
1974	73,036	
1976	73,912	
1978	70,462	
1980	75,140	
1982	76,863	
1984	80,402	
1986	82,770	
1988	88,893	
1990	94,878	
1992	105,117	
1994	108,448	
1996	107,224	
1998	103,894	
2000	98,889	98,889
2002	92,490	91,856
2005		87,945
2010		84,082
2015		82,259
2020		81,345
2025		80,974

Table A-15 shows the projected irrigation demands associated with 2000 and projected acreages.

Table A-15. Irrigation Requirements for Projected Citrus in St. Lucie County.

		2000	2005	2010	2015	2020	2025
Irrigated Acreage		98,889	87,945	84,082	82,259	81,345	80,974
Net Irrigation Requirements		2000	2005	2010	2015	2020	2025
Average	(inches)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)
January	0.43	1,480	1,317	1,259	1,231	1,218	1,212
February	0.51	1,756	1,562	1,493	1,461	1,444	1,438
March	1.87	6,438	5,726	5,474	5,355	5,296	5,272
April	2.64	9,089	8,083	7,728	7,561	7,477	7,443
May	2.38	8,194	7,287	6,967	6,816	6,740	6,710
June	1.28	4,407	3,919	3,747	3,666	3,625	3,609
July	1.19	4,097	3,644	3,484	3,408	3,370	3,355
August	0.51	1,756	1,562	1,493	1,461	1,444	1,438
September	0.17	585	521	498	487	481	479
October	0.17	585	521	498	487	481	479
November	0.26	895	796	761	745	736	733
December	0.34	1,171	1,041	995	974	963	959
Total	11.75	40,454	35,977	34,396	33,651	33,277	33,125
Net Irrigation Requirements		**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
1-in-10	(inches)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)
January	0.92	3,167	2,817	2,693	2,635	2,605	2,594
February	0.92	3,167	2,817	2,693	2,635	2,605	2,594
March	1.74	5,991	5,328	5,094	4,983	4,928	4,905
April	2.60	8,951	7,961	7,611	7,446	7,363	7,330
May	2.65	9,124	8,114	7,757	7,589	7,505	7,471
June	1.50	5,164	4,593	4,391	4,296	4,248	4,229
July	1.30	4,476	3,980	3,806	3,723	3,682	3,665
August	0.63	2,169	1,929	1,844	1,804	1,784	1,776
September	0.00	0	0	0	0	0	0
October	0.87	2,995	2,664	2,547	2,492	2,464	2,453
November	0.87	2,995	2,664	2,547	2,492	2,464	2,453
December	0.87	2,995	2,664	2,547	2,492	2,464	2,453
Total	14.87	51,195	45,530	43,530	42,586	42,113	41,921

Note: Irrigation requirements based on generic sandy soil, Ft. Pierce climate station and irrigation efficiency of 78 percent (80/20 micro/seepage ratio).

Martin County

Citrus acreage in Martin County was projected using damped trend exponential smoothing. Time series data at two-year increments was used to estimate the damped trend exponential smoothing model.

Equation A-4.

Model Parameters:	Estimate	Standard Error	T	Prob>!T!
LEVEL Smoothing Weight	.8905	.2204	4.0402	.0009
TREND Smoothing Weight	.9990	.7724	1.2934	2142
DAMPING Smoothing Weight	.7738	.1532	5.0500	.0001
Smoothed Level	43263			
Smoothed Trend	-2498			

Goodness-of-fit Statistics:	Value
Root Mean Square Error	3706.9
Mean Absolute Percent Error	6.120
Mean Absolute Error	2517.1
R-Square	.537

Equation A-4 was used to project citrus acreage in Martin County, and resulting projections are shown in **Table A-16**.

Table A-16. Historical and Projected Citrus Acreage in Martin County.

Year	Historical Acreage	Projected Acreage
1966	21,889	
1968	39,157	
1970	41,385	
1972	41,358	
1974	40,473	
1976	40,264	
1978	38,361	
1980	40,768	
1982	40,646	
1984	40,483	
1986	41,095	
1988	40,921	
1990	46,283	
1992	46,335	
1994	48,221	
1996	47,090	
1998	46,439	
2000	44,746	44,746
2002	42,208	44,746
2005		44,746
2010		44,746
2015		44,747
2020		44,748
2025		44,748

Table A-17 shows the projected irrigation demands associated with the 2000 and projected citrus acreages in Martin County.

Table A-17. Irrigation Requirements for Projected Citrus in Martin County.

		2000	2005	2010	2015	2020	2025
Irrigated Acreage		44,746	44,746	44,746	44,747	44,748	44,748
Net Irrigation Requirements		2000	2005	2010	2015	2020	2025
Average	(inches)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)
January	0.68	1,059	1,059	1,059	1,059	1,059	1,059
February	0.77	1,200	1,200	1,200	1,200	1,200	1,200
March	2.04	3,178	3,178	3,178	3,178	3,178	3,178
April	2.30	3,583	3,583	3,583	3,583	3,583	3,583
May	2.13	3,318	3,318	3,318	3,318	3,318	3,318
June	0.77	1,200	1,200	1,200	1,200	1,200	1,200
July	0.51	795	795	795	795	795	795
August	0.68	1,059	1,059	1,059	1,059	1,059	1,059
September	0.17	265	265	265	265	265	265
October	0.17	265	265	265	265	265	265
November	0.26	405	405	405	405	405	405
December	0.34	530	530	530	530	530	530
Total	10.82	16,856	16,856	16,856	16,856	16,857	16,857
Net Irrigation Requirements		2000	2005	2010	2015	2020	2025
1-in-10	(inches)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)
January	1.45	2,259	2,259	2,259	2,259	2,259	2,259
February	1.53	2,384	2,384	2,384	2,384	2,384	2,384
March	1.74	2,711	2,711	2,711	2,711	2,711	2,711
April	2.60	4,050	4,050	4,050	4,050	4,051	4,051
May	2.65	4,128	4,128	4,128	4,128	4,128	4,128
June	1.50	2,337	2,337	2,337	2,337	2,337	2,337
July	1.30	2,025	2,025	2,025	2,025	2,025	2,025
August	0.63	981	981	981	981	981	981
September	0.00	0	0	0	0	0	0
October	0.87	1,355	1,355	1,355	1,355	1,355	1,355
November	0.87	1,355	1,355	1,355	1,355	1,355	1,355
December	0.87	1,355	1,355	1,355	1,355	1,355	1,355
Total	16.01	24,941	24,941	24,941	24,942	24,942	24,942

Note: Irrigation requirements based on generic sandy soil, Stuart climate station and irrigation efficiency of 78 percent (80/20 micro/seepage ratio).

Eastern Okeechobee County

Citrus acreage in Okeechobee County was projected using damped trend exponential smoothing. Time series data at two-year increments was used to estimate the damped trend exponential smoothing model.

Equation A-5.

Model Parameters:	Estimate	Standard Error	T	Prob>!T!
LEVEL Smoothing Weight	.9990	.1935	5.1627	<.0001
TREND Smoothing Weight	.0010	.1309	0.0076	.9940
DAMPING Smoothing Weight	.9952	.0135	73.6307	<.0001
Smoothed Level	12036			
Smoothed Trend	508.889			

Goodness-of-fit Statistics:	Value
Root Mean Square Error	740.484
Mean Absolute Percent Error	8.168
Mean Absolute Error	551.16513
R-Square	.954

Equation A-5 was used to project citrus acreage in Okeechobee County, and resulting projections are shown in **Table A-18**.

Table A-18. Historical and Projected Citrus Acreage in Eastern Okeechobee County.

Year	Historical County Acreage	Projected Okeechobee County Acreage	Projected Eastern Okeechobee County Acreage
1966	2,508		
1968	3,329		
1970	3,597		
1972	3,676		
1974	4,087		
1976	4,162		
1978	4,171		
1980	4,281		
1982	6,954		
1984	8,044		
1986	7,449		
1988	8,124		
1990	8,541		
1992	10,439		
1994	11,270		
1996	12,206		
1998	12,244		
2000	12,170	12,170	5,878
2002	12,035	12,094	5,841
2005		12,937	6,248
2010		14,890	7,192
2015		16,273	7,860
2020		17,646	8,523
2025		18,193	8,787

Table A-19 shows the projected irrigation demands associated with the 2000 and projected citrus acreages in eastern Okeechobee County.

Table A-19. Irrigation Requirements for Projected Citrus in the Eastern Okeechobee County.

		2000	2005	2010	2015	2020	2025
Eastern Okeechobee County Irrigated Acreage		5,878	6,248	7,192	7,860	8,523	8,787
Net Irrigation Requirements		**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
Average	(inches)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)
January	0.94	184	196	225	246	267	275
February	0.94	184	196	225	246	267	275
March	2.38	466	495	570	623	676	697
April	2.64	517	550	633	691	750	773
May	2.89	566	602	693	757	821	846
June	1.19	233	248	285	312	338	348
July	0.43	84	90	103	113	122	126
August	0.43	84	90	103	113	122	126
September	0.17	33	35	41	45	48	50
October	0.26	51	54	62	68	74	76
November	1.02	200	212	244	267	290	299
December	0.68	133	142	163	178	193	199
Total	13.97	2,736	2,908	3,348	3,659	3,967	4,090
Net Irrigation Requirements		**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
1-in-10	(inches)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)
January	1.96	384	408	470	513	557	574
February	2.04	400	425	489	534	579	597
March	4.42	866	920	1,059	1,158	1,255	1,294
April	4.93	966	1,026	1,181	1,291	1,400	1,443
May	5.78	1,132	1,203	1,385	1,514	1,641	1,692
June	2.72	533	566	652	712	772	796
July	0.94	184	196	225	246	267	275
August	0.51	100	106	122	134	145	149
September	0.00	0	0	0	0	0	0
October	1.45	284	302	347	380	412	425
November	1.96	384	408	470	513	557	574
December	0.00	0	0	0	0	0	0
Total	26.71	5,231	5,561	6,401	6,995	7,585	7,820

Note: Irrigation requirements based on generic sandy soil, Okeechobee climate station and irrigation efficiency of 81.5 percent (90/10 micro/seepage ratio).

Sugarcane

Sugarcane is initially propagated vegetatively by planting stalk cuttings. The first harvest takes place approximately 13 months after planting. Roots are left in the ground (ratooned) and yield additional crops of sugarcane, which take about 12 months to reach maturity. Sugar production per unit of land surface declines gradually and progressively with each additional ratoon, and there comes a point where the increased yields associated with replanting outweigh the cost of replanting. In Florida, this point comes on average after four years (one planting and three ratoons).

After the final ratoon in the cycle is harvested on a parcel of land from November through March, and before replanting takes place from September through January, there is no sugarcane on that parcel. In the UEC Planning Area, this land is invariably fallowed during this period. This means there is approximately 20 percent of the land associated with sugarcane production that will not be reported as production by the FASS. This 20 percent of land will not require irrigation and is not included in the projections presented here. In the UEC Planning Area, Martin County is the only sugarcane producer.

Historical sugarcane acreage data were gathered from annual volumes of the FASS *Field Crops Summary*, and are presented in **Table A-20**.

Sugarcane production in Martin County grew gradually from 3,015 acres in 1975 to 7,180 acres in 1984. Between 1984 and 1986, production almost doubled to 14,044 acres and has remained relatively stable since. This growth between 1984 and 1986 was due to expansion by one large landowner, and according to the local IFAS extension office, no significant future changes in acreage are anticipated. Therefore, the primary projection for sugarcane production in Martin County was developed by holding the acreage at its most recent level. There may be some slight fluctuation in acreage due to the planting cycle and weather limitations.

The mean and 1-in-10 irrigation requirements for sugarcane in Martin County are shown in **Table A-21**.

Table A-20. Historical Martin County Sugarcane Acreage.

Year	Acreage
1975	3,015
1976	3,091
1977	3,158
1978	5,198
1979	5,722
1980	6,029
1981	6,664
1982	7,171
1983	6,724
1984	7,180
1985	12,570
1986	14,044
1987	14,211
1988	14,589
1989	14,415
1990	13,433
1991	13,455
1992	13,518
1993	13,518
1994	12,478
1995	12,478
1996	12,478
1997	12,478
1998[a]	12,478
1999[a]	12,478
2000[a]	12,478

a. Martin County sugarcane acreage has been combined with Palm Beach County starting in 1998; Martin County acreage is held constant at the 1997 level as confirmed by the local IFAS Extension office.

Table A-21. Irrigation Requirements for Projected Sugarcane in Martin County.

Irrigated Acreage = 12,478		
Average	**Net Irrigation Requirements (inches)**	**Gross Irrigation Requirements (million gallons)**
January	0.5	356
February	0.5	356
March	1.0	661
April	1.9	1,271
May	2.1	1,423
June	0.9	610
July	1.0	661
August	1.1	712
September	0.4	254
October	0.3	203
November	0.4	254
December	0.5	305
Total	10.4	7,065
1-in-10	**Net Irrigation Requirements (inches)**	**Gross Irrigation Requirements (million gallons)**
January	0.8	540
February	0.8	540
March	1.5	1,003
April	2.6	1,775
May	3.2	2,199
June	1.4	969
July	1.4	926
August	1.6	1,080
September	0.6	386
October	0.6	386
November	0.7	463
December	0.7	463
Total	15.8	10,729

Note: Irrigation requirements based on generic sandy soil, Stuart climate station and irrigation efficiency of 50 percent.

Vegetables

Vegetable crops were grouped together for projection purposes. This was validated by the lack of significant difference between the irrigation requirements of the different types of vegetables cultivated in the UEC Planning Area, and the production practices used on vegetable farms (different types of vegetables are sometimes grown interchangeably). Vegetables in the planning area are grown commercially in St. Lucie and Martin counties. There is some vegetable production in Okeechobee County, but not in that portion of the county within the UEC Planning Area.

Average evapotranspiration values were developed based on AFSIRS runs with planting dates of January and September. The growing season was assumed to be four months. Vegetable fields are planted and harvested sequentially, and some portion of the total acreage used for vegetable production is commonly vacant. This temporal area of vegetable land vacancy effects total irrigation requirements, but it is difficult to quantify. Production timing may change for several reasons. For example, growers may enter into a contract to harvest vegetables in a specific time window, which would in turn determine their growing season. In addition, as seepage irrigation is the predominant type of irrigation system used for vegetable production, some of these vacant fields are unavoidably irrigated, either in part or in whole. With these constraints in mind, planting and harvesting schedules were developed to calculate irrigation requirements.

St. Lucie County

St. Lucie County vegetable production is included in the "East Central" area as defined by the FASS *Vegetable Summary*, and acreage data for St. Lucie County individually is not available from the FASS. Due to the lack of historical data, future vegetable acreage was projected at its current level, which was gathered from the local IFAS extension office. Present vegetable production uses about 1,270 acres of land in St. Lucie County. This production is anticipated to remain relatively constant by the local extension office. **Table A-22** represents the irrigation requirements for vegetable crops in St. Lucie County.

Table A-22. Irrigation Requirements for Projected Vegetables in St. Lucie County.

Average	Irrigated Acreage	Net Irrigation Requirements (inches)	Gross Irrigation Requirements (million gallons)
January	1,270	0.3	21
February	1,270	0.9	62
March	1,270	2.3	155
April	1,270	2.9	197
May	0	n/a	
June	0	n/a	
July	0	n/a	
August	0	n/a	
September	1,270	0.3	21
October	1,270	0.5	31
November	1,270	0.8	52
December	1,270	0.6	41
Total		8.4	579
1-in-10	**Irrigated Acreage**	**Net Irrigation Requirements (inches)**	**Gross Irrigation Requirements (million gallons)**
January	1,270	0.4	31
February	1,270	1.3	88
March	1,270	2.7	189
April	1,270	4.0	273
May	0	n/a	
June	0	n/a	
July	0	n/a	
August	0	n/a	
September	1,270	0.4	31
October	1,270	0.7	48
November	1,270	1.3	88
December	1,270	0.8	53
Total		11.6	802

Note: Irrigation requirements based on generic sandy soil, Ft. Pierce climate station, irrigation efficiency of 50 percent and growing seasons as shown.

Martin County

Martin County vegetable production is included in the "Southeast" area as defined by the FASS *Vegetable Summary*; therefore, acreage data for Martin County individually is not available from the FASS. Vegetable acreage data were supplied by the local IFAS extension office.

Table A-23. Irrigation Requirements for Projected Vegetables in Martin County.

Average	Irrigated Acreage	Net Irrigation Requirements (inches)	Gross Irrigation Requirements (million gallons)
January	1,700	0.4	35
February	1,700	1.0	90
March	1,700	2.0	187
April	1,700	2.6	235
May	0	n/a	
June	0	n/a	
July	0	n/a	
August	0	n/a	
September	1,700	0.2	21
October	1,700	0.4	35
November	1,700	0.7	62
December	1,700	0.8	69
Total		8.0	734
1-in-10	**Irrigated Acreage**	**Net Irrigation Requirements (inches)**	**Gross Irrigation Requirements (million gallons)**
January	1,700	0.6	51
February	1,700	1.4	126
March	1,700	2.8	263
April	1,700	3.5	325
May	0	n/a	
June	0	n/a	
July	0	n/a	
August	0	n/a	
September	1,700	0.4	40
October	1,700	0.7	63
November	1,700	1.1	103
December	1,700	1.1	103
Total		11.6	1,073

Note: Irrigation requirements based on generic sandy soil, Indiantown climate station, Irrigation efficiency of 50 percent and growing seasons as shown.

Sod

The sod projections presented here refer to irrigated sod. There is additional sod harvested from non-irrigated areas (often pasture).

St. Lucie County

Currently there are two companies producing irrigated sod in St. Lucie County. Based on agricultural commodity reports and communication with the local IFAS extension office, a total estimate of 760 acres was made for these two companies. No meaningful trend could be established due to the lack of historical acreage data, and this acreage has remained constant in recent years. Therefore, irrigated sod acreage was projected to remain constant through the year 2025.

Table A-24. Irrigation Requirements for Projected Sod in St. Lucie County.

Irrigated Acreage = 760		
Average	**Net Irrigation Requirements (inches)**	**Gross Irrigation Requirements (million gallons)**
January	1.0	40
February	1.4	59
March	2.3	93
April	3.2	133
May	2.9	118
June	1.8	74
July	2.0	84
August	1.4	59
September	0.8	31
October	0.7	28
November	0.8	34
December	0.8	31
Total	19.0	783
1-in-10	**Net Irrigation Requirements (inches)**	**Gross Irrigation Requirements (million gallons)**
January	1.4	56
February	1.8	73
March	2.4	99
April	3.5	146
May	3.5	146
June	2.3	94
July	2.7	110
August	1.9	77
September	1.1	45
October	1.0	42
November	1.1	45
December	1.0	40
Total	23.6	972

Note: Irrigation requirements based on, generic sandy soil, Ft. Pierce climate station and irrigation efficiency of 50 percent.

Martin County

According to the local IFAS extension office, there are about 100 acres of irrigated sod produced annually in Martin County (primarily in Hobe Sound), and no meaningful trend could be established due to the lack of historical data. Therefore, irrigated sod acreage was projected to remain constant through the year 2025, and irrigation requirements are presented in **Table A-25**.

Table A-25. Irrigation Requirements for Projected Sod in Martin County.

Irrigated Acreage = 100		
Average	**Net Irrigation Requirements (inches)**	**Gross Irrigation Requirements (million gallons)**
January	1.1	6
February	1.6	9
March	2.2	12
April	2.9	16
May	2.5	13
June	1.4	7
July	1.4	8
August	1.4	7
September	0.8	4
October	0.7	4
November	0.8	4
December	0.8	4
Total	17.4	95
1-in-10	**Net Irrigation Requirements (inches)**	**Gross Irrigation Requirements (million gallons)**
January	1.7	9
February	2.0	11
March	2.6	14
April	3.8	21
May	3.4	18
June	2.0	11
July	1.9	10
August	2.0	11
September	1.1	6
October	1.0	5
November	1.1	6
December	1.1	6
Total	23.6	128

Note: Irrigation requirements based on, generic sandy soil, Stuart climate station and irrigation efficiency of 50 percent.

Eastern Okeechobee County

The local IFAS extension office estimates that there are about 350 acres of irrigated sod in Okeechobee County, all of which takes place within the District. Of these 350 acres, about 100 acres takes place in the UEC Planning Area (eastern Okeechobee County). No meaningful trend could be developed due to the lack of historical acreage data. Therefore, irrigated sod acreage was projected to remain constant through the year 2025. Irrigation requirements are presented in **Table A-26**.

Table A-26. Irrigation Requirements for Projected Sod in Eastern Okeechobee County.

Irrigated Acreage = 100		
Average	**Net Irrigation Requirements (inches)**	**Gross Irrigation Requirements (million gallons)**
January	1.3	7
February	1.7	9
March	2.5	13
April	3.2	18
May	3.2	17
June	1.6	9
July	1.3	7
August	1.1	6
September	0.8	4
October	1.2	7
November	1.2	7
December	1.2	7
Total	20.2	110
1-in-10	**Net Irrigation Requirements (inches)**	**Gross Irrigation Requirements (million gallons)**
January	1.8	10
February	2.0	11
March	2.8	15
April	4.0	22
May	4.1	22
June	2.4	13
July	1.9	10
August	1.6	9
September	1.2	6
October	1.5	8
November	1.5	8
December	1.6	9
Total	26.3	143

Note: Irrigation requirements based on, generic sandy soil, Okeechobee climate station and irrigation efficiency of 50 percent.

Greenhouse/Nursery

Ornamental nurseries in the UEC Planning Area are in St. Lucie and Martin counties. Nurseries in Okeechobee County are not in the UEC Planning Area. In order to project nursery acreage in the UEC Planning Area, the models shown in **Equations A-6** and **A-7** were estimated.

Equation A-6.

XORNt = f(XPOPt, D)

Equation A-7.

XORNt = f(TIMEt, D)

where:

XORNt = field nursery acreage in X county in year t.

XPOPt = historic or forecast population of X county in year t.

TIME = a time-trend variable equal to 1 in 1972 and increasing by 1 unit each subsequent year.

D = a dichotomous variable designed to catch an intercept shift in the historical acreage data.

St Lucie County

Ornamental nursery acreage has varied widely since 1972, but has generally grown in the 1990s. A model of the form shown in **Equation A-5** was estimated using robust regression, and the results shown in **Equation A-8** were obtained.

Equation A-8.

Robust Multiple Regression Using Huber's Method (C=1.345)

Dependent Stlunoncit

Regression Equation Section

Independent Variable	Regression Coefficient b(i)	Standard Error Sb(i)	T-Value to Test H0:B(i)=0	Prob Level	Reject H0 at 5%?	Power of Test at 5%
Intercept	7.4776	16.8528	0.444	0.6618	No	0.0708
D	61.9599	16.4954	3.756	0.0012	Yes	0.9473
Stlupop	0.5846	0.1358	4.304	0.0003	Yes	0.9838

Goodness-of-fit Statistics

R2	0.6079
Square Root of MSE	26.72553
Ave Abs Pct Error	37.311
F-Ratio	16.281
Durbin-Watson Value	2.0588

The projections derived from **Equation A-8** are presented in **Table A-27**. Robust regression was used to lessen the impact of unusual observations on the regression parameters.

Table A-27. Historical and Projected Ornamental Nursery Acreage in St. Lucie County.

Year	Historical Acreage	Projected Acreage
1972	53	
1973	97	
1974	36	
1975	22	
1976	34	
1977	42	
1978	31	
1979	20	
1980	108	
1981	29	
1982	47	
1983	97	
1984	178	
1985	116	
1986	118	
1987	95	
1988	79	
1989	70	
1990	79	
1991	86	
1992	117	
1993	124	
1994	127	
1995	112	
1996	112	
1997	115	
1998	123	
1999	159	
2000	120	120
2005		141
2010		163
2015		184
2020		204
2025		226

Table A-28. Irrigation Requirements for Projected Ornamental Nurseries in St. Lucie County.

		2000	2005	2010	2015	2020	2025
Irrigated Acreage		120	141	163	184	204	226
Net Irrigation Requirements		**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
Average	(inches)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)
January	1.1	5	6	7	7	8	9
February	1.7	7	8	10	11	12	14
March	2.6	11	13	15	17	19	21
April	3.5	15	18	20	23	25	28
May	3.0	13	15	18	20	22	25
June	2.1	9	11	12	14	16	17
July	2.3	10	12	14	15	17	19
August	1.7	7	8	10	11	12	14
September	1.1	5	5	6	7	8	9
October	1.0	4	5	6	6	7	8
November	1.0	4	5	6	6	7	8
December	1.0	4	5	6	6	7	8
Total	21.8	95	111	129	145	161	179
Net Irrigation Requirements		**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
1-in-10	(inches)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)
January	1.5	7	8	9	10	11	12
February	2.0	8	10	12	13	14	16
March	2.7	12	14	16	18	20	22
April	3.8	17	20	23	25	28	31
May	3.7	16	19	22	24	27	30
June	2.6	11	13	15	17	19	21
July	2.9	12	15	17	19	21	23
August	2.3	10	11	13	15	17	18
September	1.4	6	7	8	9	10	11
October	1.4	6	7	8	9	10	11
November	1.2	5	6	7	8	9	10
December	1.2	5	6	7	8	9	10
Total	26.5	115	135	156	176	196	217

Martin County

Martin County ornamental nursery acreage has fluctuated historically, but has shown some growth in recent years. In order to project Martin County field nursery acreage, the model shown in **Equation A-6** was estimated using ordinary least squares and robust regression, and the results shown in **Equation A-9** were obtained.

The variable POPt is included to account for the relationship between landscape nursery plantings for new homes and population. Historical and projected population data were as reported by the U.S. Bureau of the Census and BEBR (2002). Robust regression was used to lessen the impact of unusual observations on the regression parameters.

Equation A-9.

Robust Multiple Regression Using Huber's Method (C=1.345)

Dependent MARNON

Regression Equation Section

Independent Variable	Regression Coefficient b(i)	Standard Error Sb(i)	T-Value to Test H0:B(i)=0	Prob Level	Reject H0 at 5%?	Power of Test at 5%
Intercept	162.2456	77.1027	2.104	0.0465	Yes	0.5224
D2	-143.8812	38.4699	-3.740	0.0011	Yes	0.9474
MARPOP	0.0034	0.0007	4.892	0.0001	Yes	0.9967

Analysis of Variance Section

Source	DF	R2	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (5%)
Intercept	1		2482451	2482451			
Model	2	0.9015	507287.8	253643.9	105.224	0.0000	1.0000
Error	23	0.0985	55442.07	2410.525			
Total(Adjusted)	25	1.0000	562729.8	22509.19			

Goodness-of-fit Statistics

R2	0.9015
Square Root of MSE	49.0971
Avg Abs Pct Error	19.390

Durbin-Watson Test for Serial Correlation

Parameter	Value	Did the Test Reject H0: Rho(1) = 0?
Durbin-Watson Value	1.6415	
Prob. Level: Positive Serial Correlation	0.3436	No
Prob. Level: Negative Serial Correlation	0.5677	No

Equation A-9, corrected for 2000, was used to generate a set of primary projections, which are shown in **Table A-29**.

Table A-29. Historical and Projected Nursery Acreage in Martin County.

Year	Historical Acreage	Projected Acreage
1972	160	
1973	141	
1974	225	
1975	182	
1976	110	
1977	175	
1978	141	
1979	106	
1980	334	
1981	313	
1982	273	
1983	274	
1984	290	
1985	282	
1986	365	
1987	294	
1988	200	
1989	402	
1990	518	
1991	521	
1992	543	
1993	562	
1994	510	
1995	555	
1996	486	
1997	616	
1998	692	
1999	670	
2000	742	742
2005		786
2010		830
2015		874
2020		918
2025		963

Table A-30. Irrigation Requirements for Projected Ornamental Nurseries in Martin County.

		2000	2005	2010	2015	2020	2025
Irrigated Acreage		742	786	830	874	918	963
Net Irrigation Requirements		2000	2005	2010	2015	2020	2025
Average	(inches)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)
January	1.4	36	38	41	43	45	47
February	1.7	46	49	52	55	57	60
March	2.5	66	70	74	78	82	86
April	3.2	85	90	95	100	105	110
May	2.8	75	79	83	88	92	97
June	1.6	42	45	47	50	52	55
July	1.8	48	51	54	57	60	63
August	1.6	42	45	47	50	52	55
September	1.0	26	28	29	31	32	34
October	1.0	26	28	29	31	32	34
November	1.0	26	28	29	31	32	34
December	1.1	28	30	32	33	35	37
Total	20.4	548	581	613	646	678	711
Net irrigation requirements		2000	2005	2010	2015	2020	2025
1-in-10	(inches)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)	(million gallons)
January	1.9	50	53	56	59	62	65
February	2.2	60	63	67	70	74	77
March	2.8	76	81	86	90	95	99
April	3.9	104	110	116	122	129	135
May	3.5	93	99	104	110	115	121
June	2.3	61	65	68	72	76	79
July	2.3	63	66	70	74	78	81
August	2.4	64	68	72	76	79	83
September	1.3	34	36	38	40	42	44
October	1.3	34	36	38	40	42	44
November	1.3	34	36	38	40	42	44
December	1.3	35	37	39	41	44	46
Total	26.3	708	750	792	834	876	919

Martin County is the only producer of cut flowers in the UEC Planning Area. The local IFAS extension office estimated that approximately 40 acres of land is used at any one time for cut flower operations, and this acreage is not anticipated to change significantly through the projection horizon.

Table A-31. Irrigation Requirements for Projected Cut Flowers in Martin County.

Average	Irrigated Acreage	Net Irrigation Requirements (inches)	Gross Irrigation Requirements (million gallons)
January	40	1.1	2
February	40	1.6	2
March	40	2.2	3
April	40	2.9	4
May	20	2.5	2
June	0	1.4	0
July	20	1.4	1
August	40	1.4	2
September	40	0.8	1
October	40	0.7	1
November	40	0.8	1
December	40	0.8	1
Total		17.4	20
1-in-10	**Irrigated Acreage**	**Net Irrigation Requirements (inches)**	**Gross Irrigation Requirements (million gallons)**
January	40	1.7	2
February	40	2.1	3
March	40	2.7	4
April	40	3.9	6
May	20	3.5	2
June	0	2.0	0
July	20	1.9	1
August	40	2.0	3
September	40	0.6	1
October	40	1.0	1
November	40	1.1	2
December	40	1.1	2
Total		23.6	27

Note: Irrigation requirements based on generic sandy soil, Stuart climate station and irrigation efficiency of 75 percent.

Improved Pasture

Improved pasture is defined by the District as pasture that has the facilities in place to carry out irrigation. As of 2003, there are about 60,000 acres encompassed in water use permits issued by the District for pasture irrigation in the UEC Planning Area. Based on District knowledge and consulting with local soil and water conservation district scientists, much of this acreage is rarely irrigated. This is because the returns associated with cattle production in recent years do not justify the expense associated with pasture irrigation. When irrigation is used, it is usually in a period of drought and is done to prevent grass from dying. In many cases, this occurs on a much smaller area of pasture than the "improved" total. Unless there was evidence of active pasture irrigation within a specific county, the irrigation of that acreage was not included in the primary projection scenario analyzed in the District's regional water supply plans. Although this assumption may not be the case in some rare instances, it is much closer to actual production practices than the values given by any irrigation requirement model or permit.

The Plan assumption that most improved pasture is not irrigated does not preclude ranchers from acquiring District consumptive use permits, or carrying out pasture irrigation; however, this irrigation activity is not part of the primary projection for irrigation demand in a mean or 1-in-10 year drought year.

In the UEC Planning Area, the District and U.S. Department of Agriculture – Natural Resources Conservation Service (USDA–NRCS or NRCS) used land use maps and NRCS soil maps combined with local knowledge to estimate there are approximately 19,000 acres of improved pasture in the UEC Planning Area. This acreage is potentially routinely irrigated. Estimated average and 1-in-10 withdrawals for this acreage are shown in **Table A-32**.

Table A-32. Irrigation Requirements for Projected Pasture in St. Lucie County.

Irrigated Acreage	St. Lucie County		Martin County		Eastern Okeechobee County	
	14,300		3,700		1,000	
Average	Net Irrigation Requirements (inches)	Gross Irrigation Requirements (million gallons)	Net Irrigation Requirements (inches)	Gross Irrigation Requirements (million gallons)	Net Irrigation Requirements (inches)	Gross Irrigation Requirements (million gallons)
January	0.0	0	0.1	20	0.3	16
February	0.0	0	0.2	40	0.6	33
March	0.7	524	0.7	141	1.2	65
April	1.7	1,340	1.5	301	2.7	147
May	1.8	1,398	1.5	301	3.2	174
June	0.8	582	0.4	80	1.0	54
July	1.1	815	0.4	80	0.4	22
August	0.2	175	0.4	80	0.4	22
September	0.1	58	0.1	20	0.1	5
October	0.0	0	0.0	0	0.3	16
November	0.1	58	0.0	0	0.3	16
December	0.1	58	0.2	40	0.4	22
Total	6.5	5,009	5.5	1,105	10.9	592
1-in-10						
January	0.0	0	0.0	0	1.4	76
February	0.0	0	2.0	402	1.7	92
March	1.3	990	2.3	462	1.9	103
April	2.6	1,980	4.0	804	3.7	201
May	2.9	2,272	4.0	804	4.4	239
June	1.3	990	0.9	181	1.5	81
July	1.9	1,456	2.0	402	1.6	87
August	1.2	932	0.6	121	1.6	87
September	0.0	0	0.0	0	0.0	0
October	0.0	0	0.0	0	2.0	109
November	0.0	0	0.0	0	2.0	109
December	0.0	0	0.0	0	2.1	114
Total	11.1	8,621	15.8	3,175	23.9	1,298

Note: Irrigation requirements based on generic sandy soil, Ft. Pierce climate station and irrigation efficiency of 50 percent.

Cattle Watering

Water required for cattle watering was calculated as a function of the number of and type (beef or dairy) of cattle. Water demand estimates for cattle watering is based on the District's allocation of 12 gal/cow/day for beef cattle, and 185 gal/cow/day for dairy cattle; (35 gal/cow/day for drinking and 150 gal/cow/day for barn washing), and kept constant over the projection horizon.

St. Lucie County

In 2000, St. Lucie County had approximately 34,000 head of cattle, of which 1,000 were dairy cows, according to the 2002 FASS *Livestock Summary.*

Martin County

In 2000, Martin County had approximately 34,900 head of cattle, of which 1,900 were dairy cows (FASS 2002c).

Eastern Okeechobee County

In 2000, Okeechobee County had about 187,000 head of cattle, of which 34,000 were dairy cows (FASS 2002c). Estimates were developed for dairy and beef cattle numbers in eastern Okeechobee County based on acreages mapped by the District as dairy farms (for dairy cattle) and pasture (for beef cattle) of the area for eastern Okeechobee County. Water demand estimates were based on these cattle numbers, which are shown in **Table A-33**.

Table A-33. Water Use for Cattle Watering in the UEC Planning Area.

County/Area	Beef Cattle	Dairy Cattle	MGD	MGY
St. Lucie	33,000	1,000	0.6	212
Martin	33,000	1,900	0.7	273
Eastern Okeechobee	31,300	3,800	1.1	394
Total	97,300	6,700	2.4	879

Total Irrigated Acreage

Total irrigated agricultural acreages for the UEC Planning Area are presented in **Table A-34**, which does not include the non-irrigated land used for pasture.

Table A-34. Irrigated Agricultural Acreage in the UEC Planning Area.

Category	St. Lucie County	Martin County	Eastern Okeechobee County	Total UEC	Percent of Total
2000					
Citrus	98,889	44,746	5,878	149,513	80.4%
Vegetables	1,270	1,700	0	2,970	1.6%
Sugarcane	0	12,478	0	12,478	6.7%
Sod	760	100	100	960	0.5%
Greenhouse/ Nursery	120	782	0	942	0.5%
Improved Pasture (irrigated)	14,300	3,700	1,000	19,000	10.2%
Total	115,339	63,506	6,978	185,863	100.0%
2025					
Citrus	80,974	44,748	8,787	134,509	78.6%
Vegetables	1,270	1,700	0	2,970	1.7%
Sugarcane	0	12,478	0	12,478	7.3%
Sod	760	100	100	960	0.6%
Greenhouse/ Nursery	226	1,003	0	1,269	0.7%
Improved Pasture (irrigated)	14,300	3,700	1,000	19,000	11.1%
Total	97,530	63,729	9,887	171,186	100.0%

Total Annual Water Demand

Estimated and projected demands for the UEC Planning Area are shown in **Table A-35**.

Table A-35. Overall Water Demands for 2000 and 2025 (MGD).

Category	Estimated Demands 2000 (MGD)	Projected Demands 2025 (MGD)	Percent Change 2000-2025	Percent of Total 2000	Percent of Total 2025
Public Water Supply	36.5	77.8	113%	12%	36.5
Domestic Self-Supply	17.0	3.7	-78%	6%	17.0
Commercial & Industrial Self-Supply	3.3	4.9	50%	1%	3.3
Recreational Self-Supply	12.8	23.8	86%	4%	12.8
Thermoelectric Power Generation Self-Supply	9.8	30.0	206%	3%	9.8
Agricultural Self-Supply	212.8	197.1	-7%	73%	212.8
Total	292.2	337.3	15%	100%	292.2

Comparison with 1998 UEC Projected Water Demand

Table A-36 shows the average projected demands in the 1998 UEC Water Supply Plan and those projected in this update.

Table A-36. Average Projected Demands in the 1998 UEC Water Supply Plan and 2004 Update.

Category	1998 UECWSP for 2020	2004 UECWSP Update for 2025	Percent Change 1998 Plan (2020) vs. 2004 Update (2025)
Population	445,925.0	485,510.0	9%
Water Use (MGD)	565.4	337.3	-40%
Public Water Supply (MGD)	64.4	77.8	21%
Domestic Self-Supply and Small Public Supply Systems (MGD)	18.8	3.7	-80%
Commercial & Industrial Self-Supply (MGD)	4.3	4.9	14%
Recreational Self-Supply (MGD)	38.1	23.8	-38%
Thermoelectric Power Generation Self-Supply (MGD)	Not Addressed	30.0	
Agricultural Self-Supply (MGD)	439.8	197.1	-55%

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